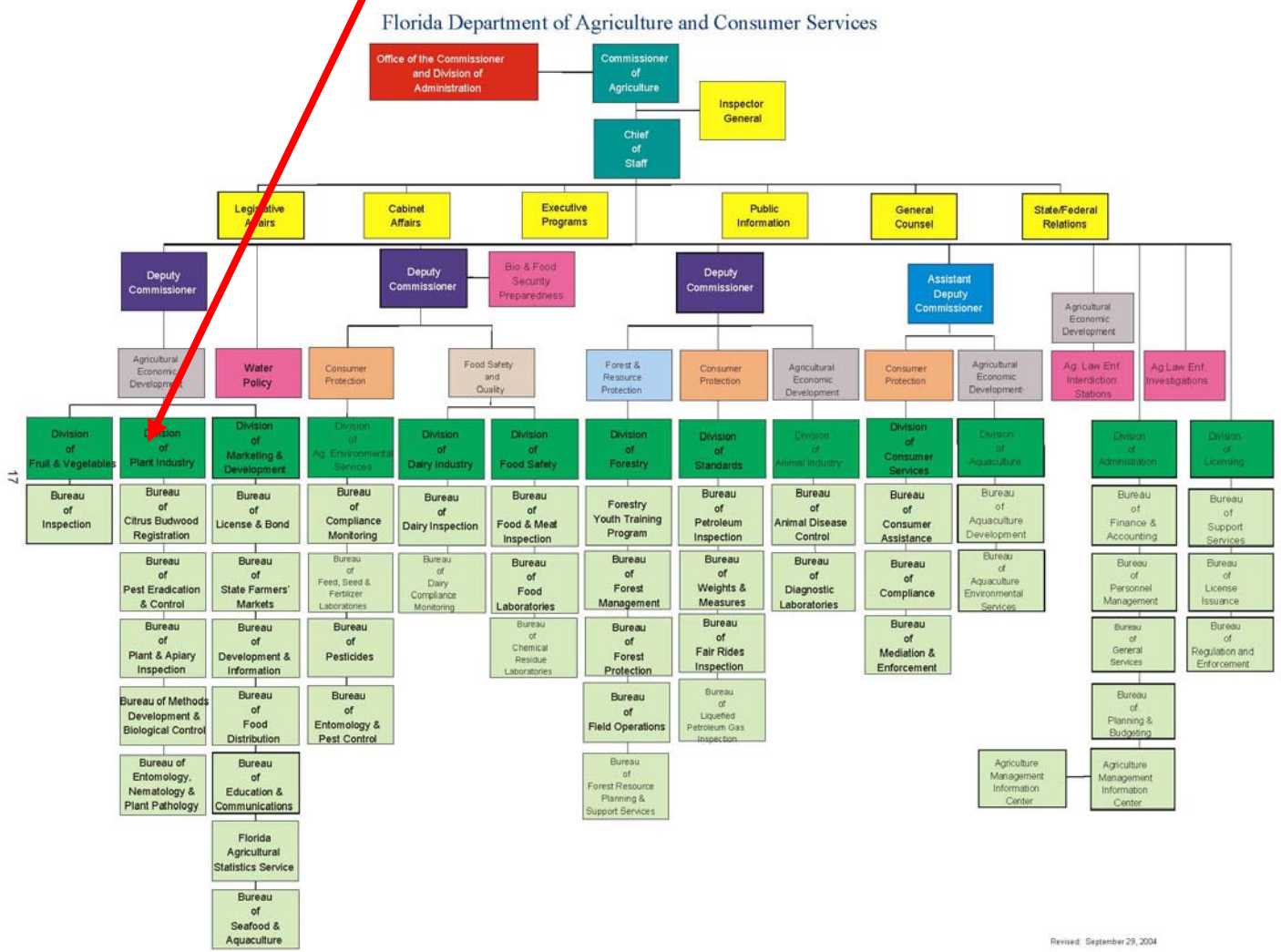
Technology Transfer for Mass Rearing Operations of *Cactoblastis cactorum*

Abbie Jo Fox, Assistant Chief
Bureau of Methods Development and Biological Control

Florida Department of Agriculture & Consumer Services
Division of Plant Industry

DPI is one of 13 Divisions in FDACS



Plant Protection Branch of the Department

Division of Plant Industry

Protection through Detection

"The Division of Plant Industry is a regulatory agency of the Florida Department of Agriculture & Consumer Services which works to **detect, intercept and control plant and honey bee pests and diseases** that threaten Florida's native plant and agricultural resources."

Biological Control Programs
(Mass Rearing and Release)

Imported Fire Ant / Phorid Flies

Tropical Soda Apple / Leaf Eating Beetle

Pink Hibiscus Mealybug / Parasites & Predators

Mediterranean Fruit Fly SIT Program

Cactus Moth – SIT Program

Technology Transfer

- Goal: Mass-rearing of Cactus Moth for SIT release program in order to establish a barrier to prevent the spread of this insect into southwestern U.S and Mexico.
  - Use of **Standard Operating Procedures** (USDA, APHIS, ARS, Tifton, GA.) which is being developed for all rearing activities.
  - Serves as an important technology transfer tool.

Biological Control Rearing Facility
Division of Plant Industry, DOACS

- 15,000 square ft. facility
- 23 full time employees dedicated to program areas
- Distinct Biological Control Programs
- Technique Development Laboratory
- Microbiology Laboratory
- Research Entomologists / Taxonomists
- On site Linear Accelerator (E-Beam)

Objectives 2006/2007/2008

- **Gain experience with mass rearing and handling of egg, larval, and pupae stages with artificial diet and cladodes**
- **Identify and establish the infrastructures necessary to rear the cactus moth through all life stages**
- **Develop a standardized mass rearing program using artificial diet**

Current Status of Program

- **Temporary walk in environmental chamber (7.5’ X 11’) set up to house developing larvae.**
- **Opuntia cladodes shipped from Texas + egg sticks sent from USDA, ARS Tifton, GA to initiate rearing program**
- **Larval development containers purchased and modified**
- **Adult moth colony and eclosion cages designed and ordered**
- **Scale filter and collection system being manufactured for use with adult colony**

All pupae were sent to Tifton for eclosion, irradiation and release

Cactus Moth Mass Rearing Program

Infrastructure Implementation

- **Two 19’ x 16’ larval development chambers**
- **One 15 x 14 adult moth colony chamber**
- **One 20 x 20 pupae eclosion chamber**
- **One 20 x 20 moth knock-down chamber**
- **Small work room in the middle**
  - Independent temperature and humidity control
  - Adult chambers equipped with scale collection filtration systems

Florida Accelerator Services & Technology

- Electron Beam Linear Accelerator
- Certified for low dose applications after calibrations of the dosimetry system to the National Bureau of Standards specifications

Florida Accelerator Services & Technology

- Experimental trials of different irradiation doses were tested to identify the correct dosages
- Target dose (200 GY) dosage was calibrated to national standards.
- Radiation biology results verified the accelerator provides the appropriate biological response as compared to Co-60 currently used in Tifton, GA.

International *Cactoblastis cactorum* Conference

- Production projections based on biological potential of insects

Eggs / Tub	4 week Rotation	Pupae / week
250	388,000	97,000
150	232,800	58,200
100	155,200	38,800

Based on number of chamber capacity, eggs / container and four week rotation

Colony Quality Control Parameters

- Pupal weights
- Avg. adult weights (male + female)
- Avg. number of eggs per sticks
- pupal eclosion (%)
- egg hatch (%)

Production Quality Control

- Number of egg sticks / pupae / adults per week
- Number of adults sterilized / shipped / released
- Number of pupae provided to cooperators
- Best sex ratio for mating cages

Cactus Moth Mass Rearing Program

Emphasis placed on;

- Use of Standard Operating Procedure as a living document
- Continuous process improvement and standardization
- Disease Management using high degree of sanitation for containers, equipment, and chambers


Thank
You